Space Weather Forecast

Issued on Friday, 13 January 2023 at 13:30 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate flares (R1-R2 radio blackouts) expected. Chance of Strong flares (R3 radio blackouts). No significant geomagnetic activity expected.

Solar Activity: Solar activity has been Low or Moderate, with three Moderate-class flares observed, the strongest of these from a region close to the southwestern limb early on 13 January. This region was also in the vicinity of a large CME (coronal mass ejection) late on 12 January which has been analysed and possibly could have an Earth-directed component. The other M-class flares were from a complex region in the central southwest quadrant. The remaining complex regions are in the eastern hemisphere approaching centre disc. Although these regions are only evolving slowly, they carry a significant risk of heightened flare activity. Two new regions emerging onto the eastern limb are likely to be increasingly complex, based on analysis of satellite imagery. Aside from the feature mentioned above, no new Earth-directed CMEs have been identified on available imagery.

Solar Wind / Geomagnetic Activity: Solar winds have recently sharply declined from slightly elevated to background levels as the Earth leaves region of faster solar winds. Magnetic field strength has also weakened from mainly moderate to weak levels. North-south component has also varied weakly, but with a period of negative magnetic field early on 12 January. Geomagnetic activity was Quiet to Unsettled.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at mostly background levels with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to be at Low to Moderate levels through the forecast period, as regions rotating off the western limb are replaced by further complex regions on the eastern hemisphere. There is a continued risk of Strong flaring.

Solar Wind / Geomagnetic Activity: There is a risk that a CME which left the northwest of the Sun on 11 January may glance the Earth on 15 January, but with low confidence in arrival and associated impacts. A further CME from the southwest quadrant is being analysed for a potential Earth-directed component. The Earth is leaving a region of fast solar winds with generally background speeds expected through the next four days, although this is subject to the influence of any CME arrivals. Generally Quiet conditions forecast, with a slight chance of Active or G1/Minor Storm intervals from any CMEs.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to remain at predominantly background with a chance of minor levels, due to the risk presented from two complex regions in the southwest quadrant, one with a recent history of a proton rich flare and CME.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	80	80	80
Very Active	R3 to R5 X	No	20	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	40	40	40	40
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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